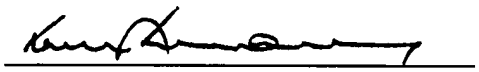
will be prepared and submitted on approval of the three new figures.

Remarks

It is urged that the new claims define an invention which is both new and unobvious over the prior art of record. In particular, PEDT/PSS used as a "camouflaged" marking substance for security elements of documents as defined by the new claims has hitherto not been known.

It is, therefore, urged that as amended the instant application is in condition for allowance which is courteously solicited.

Respectfully submitted,



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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Application No.: 09/719,881
Filed: 15 June 1999
By: Puttkammer et al.
For Marking Substances and Security Elements...

Substitute Specification with Markings to Show Changes Made

6 March 2003

Attorney Docket 000437-US

Marking [Substances] Substance and Security Markings for Testing the Authenticity of Documents[, Securities, Bank Notes, Wrappings and Products]

BACKGROUND OF THE INVENTION.

1. Field of the Invention.

The invention relates to a marking [substances] substance for security [markings] elements used to examine the authenticity of [in] documents [, securities,] such as bank notes[, wrappings and products in accordance with the preambles of claim 1] and the like.

In order to [To] raise the level of certainty against counterfeiting, marking substances are incorporated in paper pulp lines used in the manufacture of documents [, securities,] such as bank notes [, wrappings and of products] as well as of other products [are provided with marking substances]. Light-activated marking substances hitherto used are at present readily available in the market place, so that [counter fitters] counterfeiters are in a position to falsify security elements fabricated with [them] such marking substances.

2. The Prior Art.

In this connection, EP 753 623 [there is described, in this connection,] discloses a security sheet with an electrically conductive element. The security [sheets] sheet consists of a carrier matrix of predetermined [having a] fiber structure, and [the] its conductive element is a security thread constituted by a foil. The foil is coated with an electrically conductive polymer from the group of polythiophenes. The electrically conductive polymer is applied to the foil in liquid or dispersed form.

[In] U.S. 5,112,672 [there is described] discloses a security document [having] with an imbedded electrically conductive security thread. The security thread is [provided with a] coated with a metal [coating] which in turn is provided with an electrically conductive polymer for bridging any interruptions.

[In] U.S. 5,419,424 [there is disclosed] discloses a [testing] device for testing the security thread in bank notes. The testing device is provided with sensor electrodes which detect the security thread by capacitive coupling.

[In] DE 43 34 797 [there are disclosed] discloses a method of fabricating counterfeit-proof documents as well as a method of [the] testing [thereof] their authenticity. The documents contain a grid work of metal wires which are contacted at their junctions.

In EP 839 950 there is disclosed a method [for inserting] of incorporating substances in a running fibrous web. The substances are introduced into the fibre suspension at or [prior to] ahead of the site where the web enters into the machine. The substances are [introduction] introduced [takes place] at several sites distributed over the width of the fiber web, and at at least [at] one site [it is performed] the substances are introduced intermittently.

[With a view to setting up hurdles against this situation for counter fitters] In order in such circumstances to put up barriers against counterfeiters complicated [solutions] processes have been devised using light-activated marking substances in which, as described in German patent specification DE 196 53 423, light absorbing substances are additionally used which are invisible to [humans] the naked eye [are additionally used]. In this manner printed images with noticeable error sections are generated [during testing using] when conducting tests under infra-red light.

Furthermore, to improve the [certainty] safety against counterfeiting, marking substances are applied in a predetermined distribution to a web of paper to render their authenticity machine-readable. In accordance with DE 197 14 519 substances not visible by humans are used for this purpose, which are superimposed as [a] linearly designed markings on a visible printed image. Because of its physical property the marking substance is supposedly detectable by a machine. Electrical conductivity is mentioned, among others, as one of the physical properties; however, there is no teaching of any marking substance which is invisible to the human eye.

A security element currently commonly used in bank notes is embodied [in] by a foil structure consisting at least of a support foil and a metallization applied to the support foil. A so-called security thread is embedded, either completely or with windows (interruptions), into the paper web. Originally, such a [safety] security thread including recognizable demetallized sections shaped as symbols or letters served only for visual testing by humans. In attempting to improve the [certainty] safety against counterfeiting [it was considered additionally to test], additional testing of the electrical conductivity of the metallization was being considered. [Unti] However, until now, the realization of such attempts has [on the one hand] been frustrated, on the one hand, not only by the high mechanical [use] wear suffered by bank notes as a result, for instance, [by] of creasing and folding by a user, but also by bending in automatic teller machines and counting machines. On the other hand, even during the technological process of manufacturing the paper the foil structure, as a result of tension and bending, is already subjected to considerable stress[, because of tension and bending, during the technological process of manufacturing the paper]. [As a result, there] There will thus occur [in the metallization] randomly distributed fine hairline [fractures] fissures in the metallization which render any test result uncertain and not reproducible. However, to [act against] counteract counterfeiting of these security elements, it is not only necessary to prove the

presence of a metallization in bank notes, but authenticity must be recognized on the basis of measuring a certain conductivity value. In principle, this problem [is not] cannot be solved by [using] the use of metallically acting printing inks instead of vapor deposited metallizations, as proposed by DE 43 44 553 and EP 0 659 587.

Since electrical conductivity is one of the most essential properties of metals, it seems to be obvious that [counter fitters] counterfeiters will assume the electrical conductivity of a metallization. In fact, technological equipment is currently readily available for [inserting] incorporating actual metallizations including their image-like designs as counterfeits of a security element into documents, securities, bank notes, wrappings or products. However, since electrical conductivity is a testing parameter which can be detected quickly and with certainty, no desire exists at present to do away with this security element. It is an additional disadvantage that the properties of the metallization which is visible to the human eye are substantially constant, as for the majority of users it is to serve as a constant security element always recognizable [as such] in the same manner. Finally, a relatively large number of persons [are] is familiar[, in connection with its fabrication and testing,] with the secrets connected with the fabrication and testing of this humanly recognizable security element, so that the size and [unsurvaillability] undefinability of this group of persons introduces a further risk potential.

OBJECTS OF THE INVENTION.

It is, therefore, an object of the invention to propose an electrically conductive marking [substances] substance which does not suffer from the disadvantages mentioned above [and methods of their integration into the paper pulp line of documents, securities, bank notes, wrappings and products in which the disadvantages mentioned above do not occur]. It is a further object of the invention to propose a marking [substances of the kind]

substance which [contribute] contributes to improving the certainty against counterfeiting because the necessity has arisen [for] of providing a further easily variable security element which draws less attention to itself than does the [visually recognizable] metallization which is recognizable by the naked eye, or to propose a security element at [different] varying positions where it is not expected and where it can only be detected [only] by extremely accurate testing technology [operating with extreme precision]. These security enhancing characteristics and elements [serving security] are either integrated into the paper pulp line [either directly] or [in connection with other security elements included in] applied to the dried paper [pulp] line[, such as safety threads].

BRIEF SUMMARY OF THE INVENTION.

In accordance with the invention, the object is accomplished by [the characteristics and elements of claim 1 as well as their specific embodiments defined in the sub-claims] by an electrically conductive marking substance constituted by an electrically conductive polymer for integration in paper pulp lines of documents, securities and bank notes to be incorporated as security elements in paper pulp lines for testing of documents, securities, bank notes, wrappers and products or for connection with a support material for fabricating security elements, the preferred marking substance being a polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS). [Aside from the claims, the characteristics of the invention are also apparent from the description and the drawings, the characteristics constituting protectable embodiments either by themselves or in several sub-combinations, for which protection is sought] Other objects will in part be obvious and will in part appear hereinafter.

The [solution] advantage provided by the proposal in accordance with the invention [provides the advantage, that] is the provision of safety paper

with hidden detectable characteristics [polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS) in connection with safety paper, of furnishing marking substances and [safety] security elements with hidden detectable elements] which cannot be recognized by [human vision and] the naked eye but the homogeneous or partial presence of which [is to] can be tested. [Surprisingly, at] At the same time, there is the surprising advantage [results] of a continuously operating, time-saving and cost-efficient method of [introducing] incorporating the marking [substances] substance and [safety] security elements into the paper pulp [lines] line, or of applying it to the dried paper web, [and by the excellent] with such physical properties of the polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS) as [the] its good compatibility [during connection] with the paper [pulp suspension] being of advantage. Its integration into the paper is substantially less complicated than is the case with solid marking substances. The required concentrations make possible an almost transparent electrically conductive marking.

DESCRIPTION OF THE SEVERAL DRAWINGS.

[The invention will be described on the basis of the following examples and of the figures.] The novel features which are considered to be characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, in respect of its structure, construction and lay-out as well as manufacturing techniques, together with other objects and advantages thereof, will be best understood from the following description of preferred embodiments when read in connection with the appended drawings, in which:

Fig. 1 [is] shows schematic side [elevational view] and top elevational [view] views of a long strainer of a paper making machine [for depicting] to illustrate the method of [the] partial integration of the marking substance in a linear configuration into a paper pulp

line;

Fig. 2 [is a] depict schematic side [elevational view] and top elevational [view] views of a round strainer of a paper making machine [for depicting] for illustrating the same method;

Fig. 7 is a graph of a signal generated [when sweeping] by a sensor being swept over a bank note with [a homogeneous distribution of marking substance and a] an electrically conductive water mark;

Fig. 7a depicts the combining of sensor signals;

Fig. 8 is a schematic side elevational view of a water mark embossing roller with a [marking substance transfer] roller for transferring the marking substance onto a paper pulp line;

Fig. 8a is a graph of a signal of an electrically conductive water mark in conventional paper;

Fig. 9 is a schematic presentation [during] of tests by scanning sensors following partial application of marking substance onto a dried paper web or integration of marking substance into the paper pulp line;

Fig. 10 depicts graphs of signals of [the detection of] partial marking substance detection;

Fig. 11 depicts a foil structure with a support foil, a metallization and a further layer of an electrically conductive polymer;

Fig. 12 depicts another foil structure with a support foil, a metallization and a further layer of an electrically conductive polymer;

Fig. 13 depicts a foil structure made of two support foils and a metallization, with each support foil supporting a further layer of an electrically conductive polymer; and

Fig. 14 depicts a foil structure made of two support foils, a metallization and a further layer of an electrically conductive polymer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS.

[In] Fig. 1 [, there is depicted] depicts a paper making machine in schematic side and top elevational views, with a long strainer 1, a pulp [applicator] discharge 3, [output] discharge tubes 17, a control unit 18 for the [output] discharge tubes 17, an automatic valve 19 in [each output] every discharge tube 17, a pump 20 for the circulation of [the] marking substance and a supply [vessel] container 26 for the marking substance for the partial integration thereof. Furthermore, test zones 14 containing marking substance are shown.

Fig. 2 depicts a round strainer 2 of a paper making machine in schematic side and top elevational views with a pulp input 4, partial test zones 14, [output] discharge tube 17, control unit 18 for the [output] discharge tubes 17, the automatic valve 19 in [each output] every discharge tube 17, the pump 20 for the circulation of the marking substance and the supply [vessel] container 26 for the marking substance for the partial integration thereof.

Fig. 7 depicts the signal graph as a diagram of voltage U as a function of the number of channels [when sweeping] during scanning of the optical scanner sensors 10 and of the capacitive scanning sensors 11 over a bank

note with homogeneously distributed marking substance [6] and with a watermark with an electrically conductive embossed section [24]. The sensor channels 1 - 14 are depicted schematically.

Fig. 7a depicts the combining of the [signal] signals [combining] of the optical scanning sensors 10, of the capacitive scanning sensors 11 and of the optical sensors 13 [for actuating] which actuate the capacitive scanning sensors 11 during testing of a [sheet] web provided with partial test zones 14.

Fig. 8 is a schematic side elevational view of a water mark embossing roller 5 [having] with embossing segments 25 and with a marking substance transfer roller 7, an electrically conductive test zone 9 structured as a water mark 9, a supply [vessel] container 16 for marking substance and a pressure roller 27.

Fig. 8a depicts the signal graph as a diagram of voltage U as a function of the number of channels during testing of an electrically conductive test zone 9 in a paper web [not provided with] without marking substance.

Fig. 9 is a schematic presentation of testing the paper web provided with the different partial test zones 14a, 14b, 14c [with] by the capacitive scanning sensors 11 and optical sensors 13 for their actuation following a partial integration of marking substance into the paper pulp line 6 [according to Fig. 8, the optical sensors 13 for activating the capacitive sensors and with different partial test zones 14a, 14b, 14c].

Fig. 10 depicts signal graphs 23 of the partial marking substance detection according to the arrangements [in] of Fig. 9.

Fig. 11 depicts a foil structure [consisting of] with a support foil 28, a metallization 29 and a further layer 30 of an electrically conductive polymer.

Fig. 12 depicts another foil structure [consisting of] with a support foil 28, a metallization 29 and a further layer 30 of an electrically conductive polymer.

Fig. 13 depicts a foil structure [consisting of] with two support foils 28; 28' and a metallization 29, each support foil 28, 28' carrying a further layer of an electrically conductive polymer.

Fig. 14 depicts a foil structure [consisting of] with two support foils 28, 28', a metallization 29 and a further layer 30 of an electrically conductive polymer.

Example 1:

Figs. 1 and 2 depict the manner in which a partial application of [the found] polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS) is [being] accomplished by metering devices positioned precisely over the paper pulp line 6. The [precondition] prerequisite for a [homogeneous] uniform supply of the metering devices with marking substance is a continuous circulation [by the pumps 20] of the paper pulp in the entire tubular system including the supply [vessel] container 26 of the marking substance to be partially integrated, by means of the pumps 20. The marking substance is partially applied to, or integrated into, the paper pulp line by an array of metering devices each consisting of an output tube 17 with an automatic valve 19. This leads to the formation, [in dependence of] under the control of the valves 19, of linear continuous test zones 14a, discontinuous test zones 14b or [doted] dotted test zones 14c. [See] In this connection, see also Fig. 9. [By cutting] When the dried paper [pulp line] web is cut into sheets partial test zones 14 with the marking substance result. These may extend over the entire width or length of the sheet, or they may be present as sections over the length or width of the sheet. The width of the lines or line sections must

[by] be adjusted to the resolution of the scanning sensors 10; 11. Preferably, the width of the line is chosen to be 2 mm.

The use of the electrically conductive [polymers] polymer polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS) results in the advantage [that these polymers are compatible] of its good compatibility with the other [contents] ingredients of the paper pulp. The integration into the paper pulp is thus substantially less complicated than it is [in the case of] with solid marking substances since the electrically conductive [polymers are] polymer polyethylene dioxythiophene polystyrene sulfonate is also available in liquid [state] form. The required concentrations make possible [a substantially] an almost transparent electrically conductive marking.

Example 2:

[As shown in] Fig. 8 [, an] shows how a printed image of [the] PEDT/PSS is produced on the paper web 6 by means of the embossing roller 5 and the marking substance transfer roller 7. The [printed image] imprint of the embossing segments 25 corresponds to the pictorial rendition of the electrically conductive test zone 14 shown as a water mark 9.

Example 3:

Figs. 1 and 2 depict [that] how the test zones 14 in the paper [pulp] web 6 are [tested] examined for [the] any partial or homogeneous presence of marking substance. The test result derived therefrom affects, by way of the control unit 18, the automatic valves 19 in the [output] discharge tubes 17.

As has already been mentioned, Figs. 7, 7a, 8a, 9 and 10 depict the testing in different applications, with corresponding signal graphs.

[On the basis of] Based on a water mark in the embossed area 24, Fig. 7 depicts the testing of the electrical conductivity of the paper web 6 as a reference test relative to the test of the pictorial structure of the water mark 9. The paper web [6] with the water mark sequentially moves in the direction of the arrow through an array of optical scanning sensors 10 and a further array of capacitive scanning sensors 11. The associated signal graph depicts the matching voltage course of the optical scanning sensors 10 and of the capacitive scanning sensors 11, shown here as a function of the number of the channels.

As shown in Fig. 7a, here, too, the sensor channels are sequentially energized in the manner described above.

Figs. 9 and 10 show the [testing] examination of [marking substance] linearly deposited PEDT/PSS as marking substance on the paper web [6] as well as the signal graphs 23 generated thereby.

In Fig. 9a, the paper 6 contains a test zone 14a [consisting of marking substance applied in] with a continuous linear [pattern] application of PEDT/PSS as marking substance. When passing through [the] a test [zone] facility consisting of [the] optical sensors 13 and [the] capacitive scanning sensors 11, a corresponding continuous voltage curve U = f(t) is generated in the signal graph 23.

In Fig. 9b, the application of the PEDT/PSS as marking substance is [applied in an] shown as a pattern interrupted [in] at regular intervals. During testing, a signal graph 23 is generated with corresponding regular breaks in the voltage curve U = f(t).

In Fig. 9c, the application of PEDT/PSS as marking substance in the test zone 14c is shown as a pattern of irregularly interrupted intervals. This,

too, is reflected in the resulting signal graph 23.

Example 4:

Hereafter, [The] use of the electrically conductive PEDT/PSS as marking substance is explained with reference to Figs. 11 to 14 in the context of a foil structure {to be included] incorporated in a paper pulp line 6 [will hereinafter be explained with reference to Figs. 11 to 14].

The foil structure of the [safety] security element to be included in a paper pulp line contains a support foil 28 made, for instance, of polypropylene, of a thickness of preferably 40 µm. [The] A metallization 29 applied to the support foil 28, for instance, by vapor deposition or sputtering, is of an additional thickness of about 2 nm.

The metallization 29 is provided with demetallized sections shaped, for instance, as letters or numbers, which can be recognized in transmitted light by [human vision] the naked eye. The demetallization extends [in sections] sectionally up to the edge of the support foil 28. At its obverse side the support foil 28 is provided with a further layer 30 made of the PEDT/PSS. [in particular] The specific PEDT/PSS (polyethylene dioxythiophene polystyrene sulfonate) in accordance with formula CPP105 is applied on the support foil 28 at a thickness of 1 µm to 2 µm. The addition of the further layer 30 results in a negligible increase in thickness. The foil structure [including] with the marking substance in accordance with the invention included into the paper web as a security element [into the paper pulp line] does not [, therefore, in any way adversely affect by] because of its insignificantly changed thickness adversely affect documents or bank notes made from the paper [pulp line] web, even in a stack of considerable height. Neither will the paper be weakened because of its increased thickness at the position where the [safety] security element is embedded.

The metallization 29 applied to the support foil 28 by vapor deposition or sputtering, for instance, has a thickness of a few atomic layers and, [is thus relatively brittle] depending upon the surface structure of the support foil, is thus relatively brittle. Folding, bending or creasing leads to arbitrarily distributed hairline [fractures] fissures which render impossible any intended measurement of the conductivity of predetermined sections of the metallization 29. By contrast, [The] the other layer 30 made of PEDT/PSS [, however,] is flexible and elastic and, compared to the metallization 29 and depending upon the surface structure of the support foil 28, is of a much higher ductility [or expandability with respect to the surface structure of the support foil 28]. Even when bending, creasing or folding a bank note, for instance, [is bent, creased or folded there will result not] no interruption [or discontinuation] of the further layer 30 of PEDT/PSS will result. Hence, the testing devices installed, for instance, in automatic teller machines will now derive, for predetermined sections of the security element, a value of the conductivity from the metallization 29 [provided] applied in accordance with the state of the art [, including any] with possible hairline [fractures] fissures and from the relatively high-ohmic layer 30 of PEDT/PSS connected in parallel to the metallization 29.

Example 5:

A preferred embodiment of the foil structure including PEDT/PSS as the inventive marking substance for a security element [in accordance with the invention, [for instance,] for instance in a bank note, is depicted in Fig. 11. Fig. 11 depicts the support foil 28 on one side of which [there has been applied] the metallization 29 has been applied. The other side of the support foil 28 carries the further layer 30 [made] of [the electrically conductive polymer] PEDT/PSS.

The further layer 30 of PEDT/PSS is applied to the carrier foil 28 by conventional technological processes., for instance, by calendering. This leads to a compound or laminated foil, to which the metallization 29 is subsequently applied [as] by vapor deposition, for instance.

Of course, it would also be possible to apply the further layer 30 of PEDT/PSS [electrically conductive polymer] subsequent to vapor deposition of the metallization 29 [after its vapor deposition] on the support foil 28. In such a foil structure, the further layer 30 would bring about a certain protective action in respect of the metallization 29.

Example 6:

Fig. 12 depicts another preferred embodiment of the foil structure [including] with PEDT/PSS as the marking substance in accordance with the invention. The support foil 28 and the metallization 29 are shown. [Between] A further layer of PEDT/PSS is disposed between the support foil 28 and the metallization 29 [the further layer 30 of PEDT/PSS is provided] as a bonding agent [between support foil 28 and metallization 29]. The arrangement of the further layer 30 of PEDT/PSS as a bonding agent is not limited to improving the adhesion between the support foil 28 and metallization 29. The further layer 30 of PEDT/PSS may be applied between any other desired foils or layers for improving their bond. However, used as a bonding agent between the support foil 28 and the metallization 29 results in the advantage that on the substantially more elastic further layer 30 of PEDT/PSS the relatively brittle metallization 29 [is capable of withstanding] can withstand substantially higher mechanical stresses than if vapor deposited directly on the support foil 28.

Example 7:

Fig. 13 depicts a foil structure for a security element [including the] with PEDT/PSS as the marking substance in accordance with the invention using a support foil 28 to which [the] a metallization 29 has been applied. The metallization 29 is covered by a further support foil 28'. This is done, for instance, for the protection of the metallization 29 if, with [a window] an interrupted thread or strip partially embedded in the paper web, it is subjected to higher stress. Increased stresses during the technological process of paper production are a further reason for the use of [t a] the further support foil 28'. At least one of the support foils 28; 28' is provided with the further layer of PEDT/PSS [made from electrically conductive polymer].

Example 8:

In Fig. 13, both support foils 28; 28' are provided with a further layer 30 of PEDT/PSS, whereas [in] Fig. 14 [there is shown] depicts an embodiment in which only one of the support foils 28 is provided with the further layer 30 of PEDT/PSS [electrically conductive polymer].

The invention is not restricted [that] to the inventive marking substance PEDT/PSS [in accordance with the invention] is used as a further layer 30 in a foil structure. The marking substance PEDT/PSS in accordance with the invention may be included in the paper pulp line as a security element [in] of any [form] desired configuration.

Example 9:

The [certainty] improved certainty against counterfeiting is [improved] served by providing, in addition to the electric conductivity, further [characteristics] security elements and [to combine] by combining them appropriately. Thus, for instance, in addition to the electric conductivity of [the polymer] PEDT/PSS there may be provided marking pigments which can be

recognized by [human vision] the naked eye as well as those which can be detected only by appropriate testing devices, with special light sources and optical sensors. Moreover, the invention also extends to the combination of the electric conductivity [with] and such additives which posses magnetic [characteristics] properties. Of particular advantage, in the context of the invention, is a combination of the electric conductivity and optical and magnetic marking substances. As a preferred application, mention is to be made of hiding the additives with magnetic properties by adding marking [substances] pigments visible to [humans] the naked eye. In this manner, a potential counterfeiter will be uncertain about the presence of a magnetically active substance, particularly in view of the fact that the quantities used are small and that their magnetic [action] effects cannot be easily detected.

In addition to the mere presence of optically effective additives in the PEDT/PSS, the invention [also] extends to arranging the optically effective additives within the electrically conductive polymer in a manner resulting in optical encoding, such as, for instance, a dye pattern which may be evaluated by testing devices. The same is applicable to the magnetically effective additives the inventive arrangement [in accordance with the invention] of which leads to magnetic encoding such as [, for instance,] a magnetic line code, for instance.

What is claimed is:

30. (New) A device for rendering sheet material secure from counterfeiting, comprising a pattern of predetermined configuration consisting of polyethylene dioxythiophene polystyrene sulfonate (PEDT/PSS) applied to the sheet material.

31. (New) The device of claim 30, wherein the sheet material comprises paper and wherein the pattern of PEDT/PSS is applied to the paper in the wet pulp state thereof.

32. (New) The device of claim 30, wherein the sheet material comprises paper and wherein the pattern of PEDT/PSS is applied to the paper in a dried continuous web state thereof.

33. (New) The device of claim 30, wherein the PEDT/PSS is of the CPP105 formulation.

34. (New) The device of claim 30, wherein the PEDT/PSS in its applied state is overtly indistinguishable from the paper.

35. (New) The device of claim 34, wherein the PEDT/PSS has a surface resistance determined by at least one of its manner of application, its manner of integration, its composition and its specific formulation.

36. (New) The device of claim 35, wherein the PEDT/PSS contains an additive.

37. (New) The device of claim 36, wherein the additive is at least one of a pigment recognizable by the naked eye, an optically active or actuable pigment or a pigment of magnetic properties.

38. (New) The device of claim 30, wherein the sheet material contains a water mark and the PEDT/PSS applied to the water mark.

39. (New) The device of claim 31, wherein the PEDT/PSS is partially or homogeneously applied to the paper in the wet pulp state thereof.

40. (New) The device of claim 32, wherein the PEDT/PSS is partially or homogeneously applied to the paper in the dried state thereof.

41. (New) The device of claim 31, wherein the paper in the wet pulp state thereof is provided with a security element comprising a foil and wherein the PEDT/PSS is applied to the security element.

42. (New) The device of claim 41, wherein the PEDT/PSS is at least partially applied to the foil as a printed image.

43. (New) The device of claim 41, wherein the foil is embedded in the paper in the wet pulp state thereof and comprises a first support foil provided with a metallization comprising sectional demetallizations covered by a at least a further layer comprising PEDT/PSS.

44. (New) The device of claim 43, wherein the PEDT/PSS is applied as a bonding agent between at least the first support foil and the metallization and the first support foil and the paper in its wet pulp state.

45. (New) The device of claim 44, wherein a layer of PEDT/PSS is applied to the first support foil on the surface thereof opposite the metallization.

46. (New) The device of claim 44, wherein a metallization is applied to one surface of the first support foil and the PEDT/PSS is applied as a layer on the metallization.

47. (New) The device of claim 43, wherein the metallization is covered by a further support foil and at least one of the first and further support foils is covered by a layer of PEDT/PSS.

48. (New) The device of claim 43, wherein the elasticity coefficient of the layer of PEDT/PSS is greater than the elasticity coefficient of the metallization.

49. (New) The device of claim 30, wherein the PEDT/PSS is applied as a component of a printing ink.

50. (New) The device of claim 30, wherein the PEDT/PSS prior to its application to the sheet material is connected to at least one of a foil, a curable lacquer layer, a reflective layer and a protective layer.

51. (New) The device of claim 30, wherein the PEDT/PSS is applied by one of printing, spraying and submersion.

52. (New) The device of claim 30, wherein the sheet material comprises at least one of a web of paper and a foil applied to the web.

53. (New) The device of claim 30, wherein the sheet material comprises at least one of a bonding agent and a primer.

54. (New) The device of claim 30, wherein the sheet material comprises a packing material.

55. (New) The device of claim 30, wherein the sheet material comprises an article.

56. (New) The device of claim 30, wherein the sheet material comprises a

security element recognizable by the naked eye.

57. (New) The device of claim 30, wherein the PEDT/PSS is applied as at least one continuous surface.

58. (New) The device of claim 30, wherein the sheet material comprises a discontinuity and the PEDT/PSS extends over the discontinuity.

59. (New) The device of claim 30, wherein the PEDT/PSS is applied as a pattern comprising at least one line.

60. (New) The device of claim 30, wherein the PEDT/PSS is applied of a pattern comprising a plurality of dots.

61. (New) The device of claim 30, wherein the PEDT/PSS is detectable by at least one of its electric conductivity and optical properties.

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ABSTRACT OF THE [DISCLOSURES] DISCLOSURE.

The invention relates to a marking [substances] substance for security documents of the kind difficult to discern by counterfeiters. The preferred marking substance is polyethylene dioxythiophene polystyrene sulfonate and, more particularly, PEDT/PSS of the CPP105 formulation.

The invention relates to a marking [substances and] substance for security [elements] documents of the kind difficult to discern by counterfeiters. The preferred marking substance is polyethylene dioxythiopene polystyrene sulfonate and, more particularly, PEDT/PSS of the CPP105 formulation. [a method of integrating them into the paper pulp line of documents, securities, bank notes, wrappings and products as well as a testing method. The task of the invention is to propose marking substances which contribute to increasing the certainty against counterfeiting and which can be detected only by testing technology operating with extreme accuracy. In accordance with the invention, the marking substance is fed from a supply vessel by way of output tubes into the paper pulp line or, when producing water marks, to the paper pulp line by transfer rollers by way of embossing segments of an embossing roller. The electrically conductive marking substance is connected as an electrically conductive polymer with a foil of the security element to be included in the paper pulp line. Or it is applied as a liquid application medium to the support material. In accordance with the invention, the marking substance is detected by multiple tests in accordance with its electric conductivity, its physical parameters or chemical properties.]

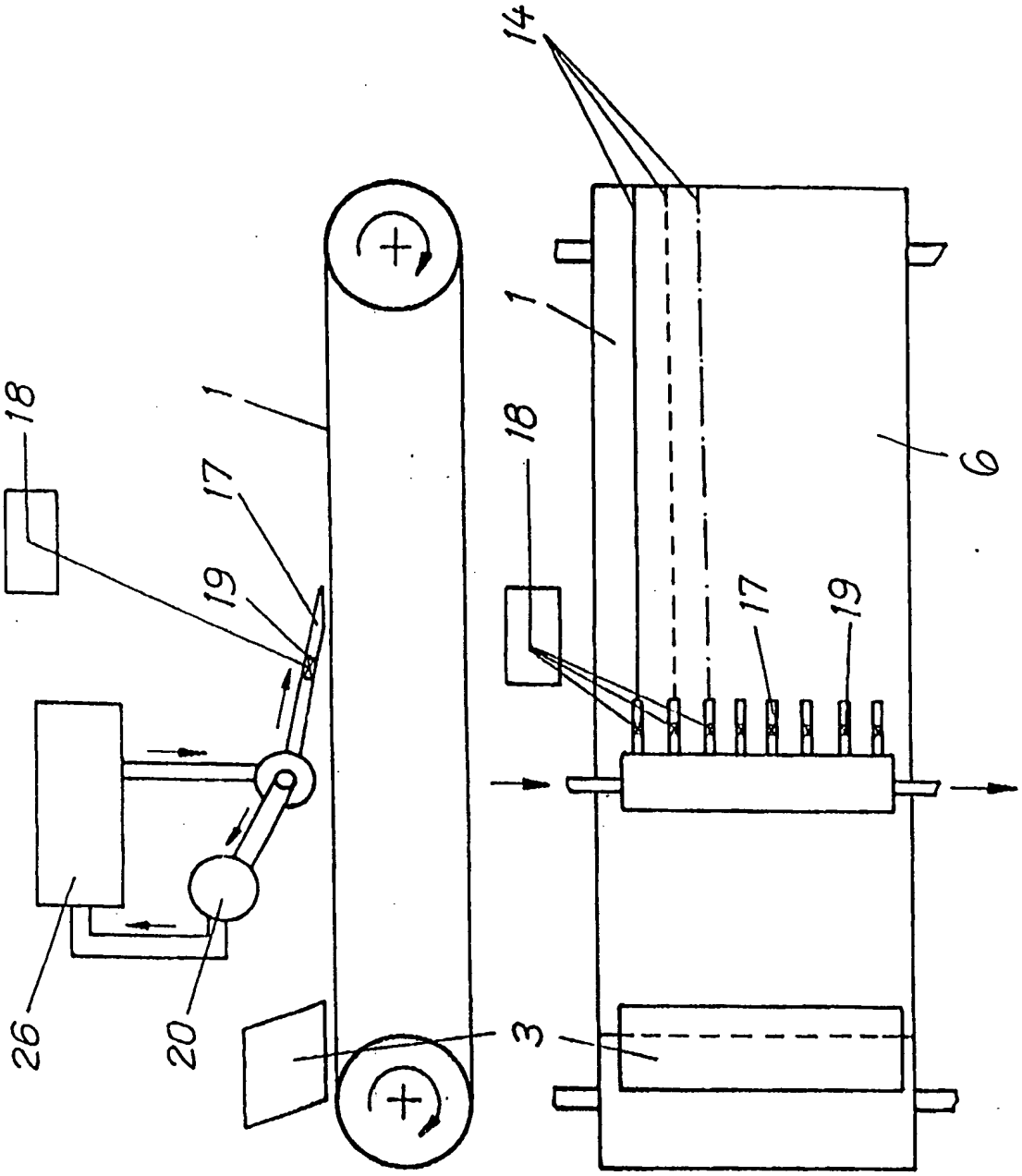
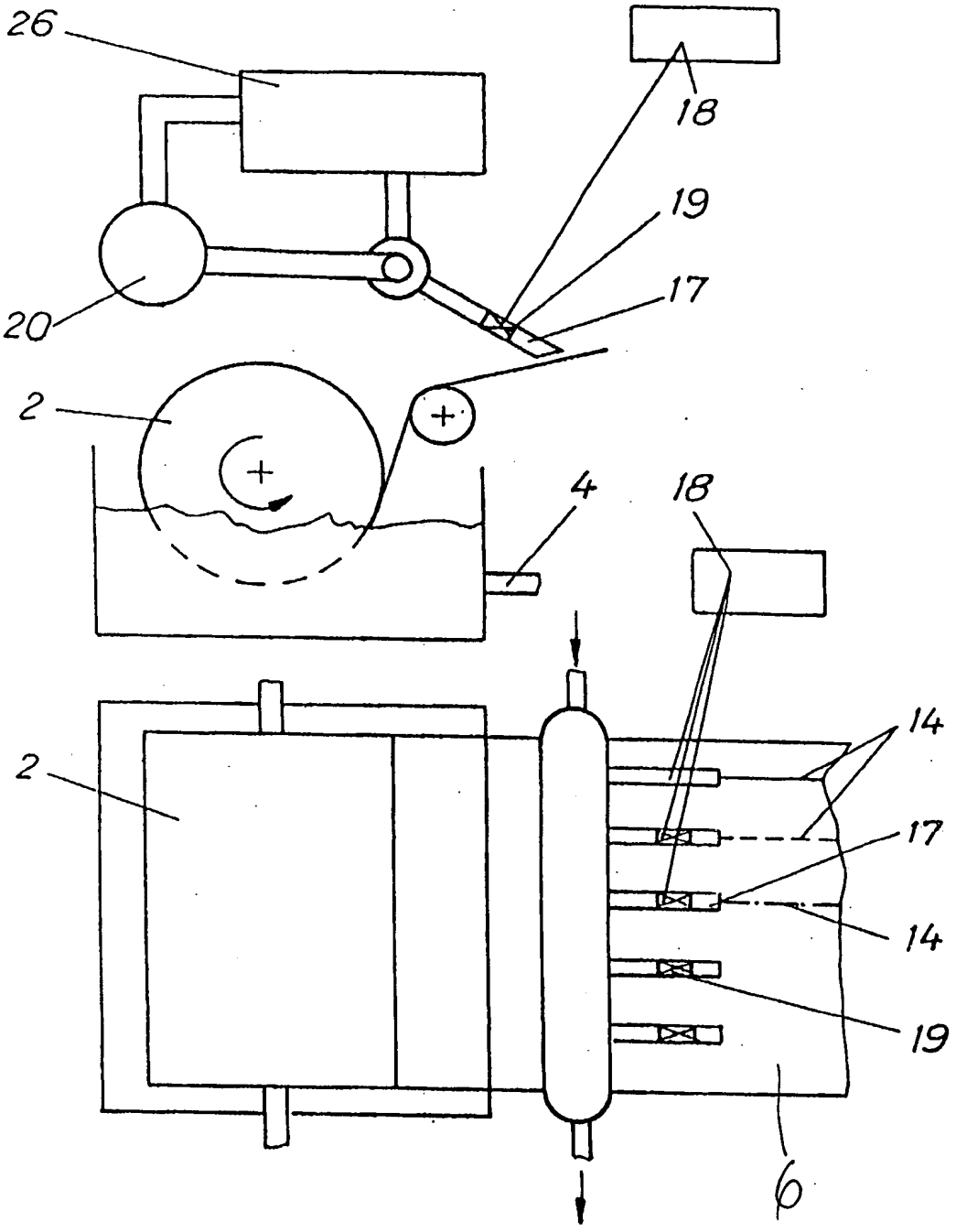


Fig. 1

09/719,841
Pat. Appl. #12

Fig. 2



~~Fig. 3~~

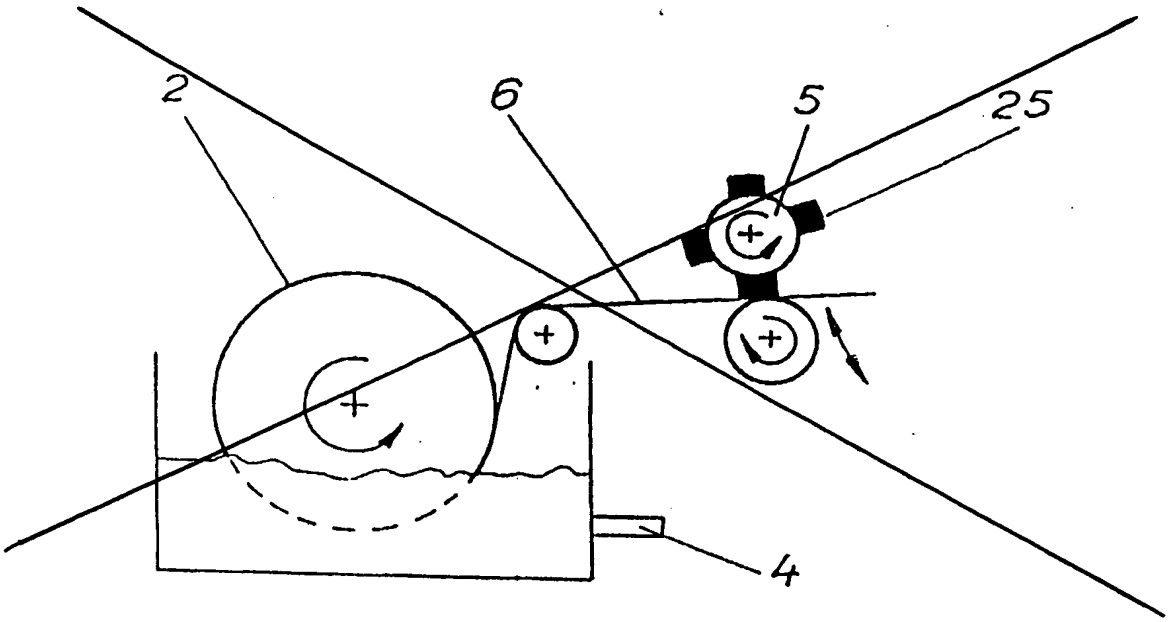


Fig. 8